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Focus Autism Other Dev Disabl 2006 21: 211

DOI: 10.1177/10883576060210040201

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Increasing Appropriate Social Interactions of Children With Autism Spectrum Disorders Using Social Stories™

Dorothy Scattone, Daniel H. Tingstrom,
and Susan M. Wilczynski

To date there are more than one dozen studies that validate the use of Social Stories™ as an effective behavioral intervention. Many of these studies focused on decreasing inappropriate behaviors (e.g., aggression, screaming, and grabbing toys), and most combined Social Stories with another intervention. The present study used a multiple baseline design across participants to investigate the effectiveness of Social Stories when used as a sole intervention to increase the appropriate social interactions of 3 children with autism spectrum disorders toward peers both with and without disabilities. During baseline, participants demonstrated few appropriate social interactions, although all had some functional expressive language. An increase in appropriate social interactions occurred for 2 of the participants after the intervention was implemented. These findings suggest that Social Stories may be effective for some children with autism spectrum disorders; however, the population they best serve has not yet been fully identified.

The impairment in social interaction that characterizes children with autism spectrum disorders (ASD) is severe and profound and may manifest itself in language, play, eye contact, and gestures (Kanner, 1943). Although many strategies successfully address this core deficit, a majority of these procedures require intrusive adult prompts, extensive time to train teachers and peers (Gonzalez-Lopez & Kamps, 1997; Zanolli, Daggett, & Adams, 1996), and, in some cases, the presence of an expert (K. Pierce & Schreibman, 1997). An intervention that is relatively simple for teachers and practitioners to implement is called Social Stories™ (Gray, 1998).

Social Stories are individualized short stories that may increase appropriate social interactions of children with ASD by teaching them the relevant components of a given social situation (Gray, 1998; Gray & Garand, 1993). They focus on describing and explaining the cues in that situation as well as

teaching appropriate responses. Gray (2004) has suggested that the most successful stories adhere to a specific format and guidelines (see Appendices A and B). According to Gray (1998), Social Stories have been used to decrease fear, aggression, and obsessions; introduce a change in routine; teach academic skills; and teach appropriate social behavior; however, Gray herself has not empirically validated their use.

Social Stories are similar to other interventions, including self-management (i.e., K. L. Pierce & Schreibman, 1994) and written scripts (Krantz & McClannahan, 1993, 1998) because they identify necessary components of a given social situation in a written format. In addition, like self-management and scripting, Social Stories transfer stimulus control from the teacher and peers directly to the child with autism. Furthermore, Social Stories share similarities with priming strategies (Zanolli, Daggett, & Adams, 1996) because they “prime” the appropriate responses to a given social situation just before the social situation takes place.

Over the past 10 years, researchers have shown Social Stories to be successful when applied to a wide variety of problem behaviors including aggression, screaming, grabbing toys, using inappropriate table manners, and crying (Kuoch & Mirenda, 2003; Rowe, 1999; Scattone, Wilczynski, Edwards, & Rabian, 2002). Swaggart and colleagues (1995) were the first to empirically validate this intervention by teaching a young girl with autism appropriate greeting behavior and two boys—one with autism and one with a pervasive developmental disorder—how to share. Swaggart and associates observed a reduction in aggression as well as an increase in appropriate greetings and sharing for these participants. Researchers have also found Social Stories to be effective in decreasing tantrums (Kuttler, Myles, & Carlson, 1998; Lorimer, Simpson, Myles, & Ganz, 2002), cheating, and negative comments when playing games. These behavior changes may be maintained over time (Kuoch & Mirenda, 2003).

Scholars have also used some rather unique adaptations of the Social Story format. Moore (2004) developed Social Stories in order to assist a young child to sleep in his own bed. Brownell (2002) adapted the Social Story texts to an original tune and sang them with a guitar accompaniment to four participants in order to improve problem behaviors (i.e., loud vocalizations, scripting, and repeating instructions). Brownell found that Social Stories were just as effective when sung as they were when read to these participants.

Researchers have also investigated the effectiveness of Social Stories for skill acquisition. Hagiwara and Myles (1999) adapted Social Stories to a computer-based format in order to teach hand washing to two participants and on-task behavior to another. However, they observed only modest improvements from baseline to intervention. Barry and Burlew (2004) taught play skills and choice to two participants with severe autism. Improvements occurred, and the participants learned to play appropriately with materials and peers. Ivey, Heflin, and Alberto (2004) successfully taught three children with Pervasive Developmental Disorder–Not Otherwise Specified (PDD–NOS) to prepare for novel activities, including having a birthday party, making a purchase, and playing with unfamiliar toys.

Investigators have also examined Social Stories as a means for improving social interactions for children with autism. Norris and Dattilo (1999) created Social Stories in order to improve a young girl's initiations and responses to peers during lunchtime. They developed three Social Stories that included picture prompts, and each day they randomly selected and read to her one of these stories. Although inappropriate verbalizations decreased, all social interactions also decreased, suggesting either that the varied content of the Social Stories made it difficult for the participant to focus on more than one instruction or that Social Stories may need to be part of a treatment package that includes other interventions when targeting behavior as complex as social initiations and responses.

Many studies have combined Social Stories with other interventions, including verbal and pictorial prompts, behavior charts, reinforcement for appropriate responding, and, in one case, a social skills training methodology and a response cost system (Swaggart et al., 1995). Thiemann and Goldstein (2001) used a treatment package in their Social Story intervention for targeting conversation skills (i.e., initiations, requests, responses, and securing attention) for five participants with autism. They combined the Social Stories with verbal prompts, pictorial cues, and self-evaluative video feedback. The treatment package was effective for developing these skills, and Thiemann and Goldstein observed some generalized treatment effects across untrained behaviors. However, they did not assess individual components of the package, making it difficult for other researchers to determine the exact role that Social Stories played in the improvements for the participants.

Scattone et al. (2002) investigated the use of Social Stories as a sole intervention without the use of verbal or pictorial prompts or another intervention for three participants with autism. A reduction in disruptive behaviors (i.e., chair tipping

and staring) occurred for two of the three participants. However, improvements for the third participant (i.e., regarding shouting) were modest at best.

To date, many of the studies involving Social Stories have been undertaken with the aim of reducing isolated inappropriate behaviors, with some investigations targeting skill acquisition and increases in appropriate social interactions. Also, many of these previous studies have included other interventions or components in addition to Social Stories. The present investigation focused on building and increasing appropriate social behaviors rather than decreasing behaviors by using Social Stories as a sole intervention. In addition, the present study aimed to correct some of the limitations of a previous study (Norris & Dattilo, 1999) that attempted to promote appropriate social interactions. This was accomplished by administering only one Social Story to each participant. Thus, the present study was designed to evaluate the effectiveness of Social Stories in increasing the appropriate social interactions of children with ASD toward their peers when used without other systematic behavioral intervention(s).

Method

Participants

Three boys between the ages of 8 and 13 years who had been previously diagnosed with an ASD participated in the study. These students were selected because they did not initiate or respond to peers either appropriately or at all during free-time activities, according to teacher report. Each student was a member of a self-contained special education classroom or a general education classroom at an elementary or middle school in the southern United States. All students had intelligible speech and were capable of speaking in complete sentences. Written permission was obtained from the parents of each participant.

Steven. Steven, an 8-year-old boy, was a member of a self-contained special education class consisting of one teacher, one assistant, and four other students with developmental disabilities. His peers were approximately the same age and had cognitive delays, but none had autism. Steven's academic curriculum consisted mainly of kindergarten class work, including identifying shapes and colors, learning to count, and developing pre-reading skills. Steven had not yet written his name or completed simple addition or subtraction problems.

Although he was capable of speech, Steven had difficulty with conversation skills and did not initiate or maintain conversations with others. Although he did not elaborate on topics, he could answer simple questions such as "What do you want to play with?" In addition, he was capable of labeling items when they were held up in front of him and he was asked, "What's this?" His self-help skills were good, and he was capable of independently toileting, feeding, and dressing with some assistance with buttons and zippers.

Steven was seldom observed interacting appropriately with peers during unstructured free-time activities (i.e., recess), and he often isolated himself in a corner of the classroom, where he usually exhibited stereotypical behavior (e.g., playing with rolled paper) or screamed and threw toys. Occasionally he sat with peers while they engaged in an activity (e.g., coloring, building with blocks); however, generally he did not either initiate or respond to them.

Steven's intelligence quotient (IQ), as measured by the *Kaufman Assessment Battery for Children* (Kaufman & Kaufman, 1983), yielded a mental processing composite of 67. His score on the *Diagnostic Achievement Battery—Second Edition* (Newcomer, 1990) yielded a word knowledge score of 60, a story comprehension score of 65, and a math reasoning score of 65. He received a diagnosis of autistic disorder through an area school in conjunction with a local university's School Psychology Service Center and was referred to the center for treatment.

Steven lived in a lower-middle class, single-parent home. His mother was a high school graduate and did not work outside the home. Steven did not have any siblings. Steven's mother reported that he often had difficulty with change and became upset when things in the environment, including the living room furniture, were moved. She also reported that he did not interact much with extended family members and often preferred to play alone.

Steven was not yet able to read fluently; therefore, his teacher read his Social Story to him once daily approximately 5 min prior to his unstructured free-time activity (i.e., recess).

Drew. Drew, a 13-year-old boy, was a member of a general education class for most of the day and received special education supports for math. According to his teacher, he was a B average student. Drew was capable of requesting help and information and responding to questions directed to him by peers and adults. He had some ability to converse and was capable of elaborating on a topic; however, he was not observed initiating or responding much to others. He was independent with self-help skills but was not adept at sports and experienced poor motor coordination with running, catching a ball, and handwriting.

Drew sometimes initiated socially to peers during unstructured free-time activities (i.e., lunch); however, his initiations were infrequent and consisted mainly of inappropriate comments (e.g., animal noises) or inappropriate gestures (e.g., rubbing his stomach, shaking his bottom). Although Drew's peers attended general education classes and none of them had autism or other developmental disabilities, they often encouraged his inappropriate behavior with laughter. Drew was able to follow rules and lined up with the other students for lunch. In addition, he independently bought his lunch at the counter and then sat at one of the several small tables in the cafeteria with peers.

Drew was an only child who lived with his parents in a middle-class area. His mother was a high school graduate, and

his father had some college education. Both parents worked outside of the home. Drew's mother reported that Drew enjoyed swinging alone in the backyard for hours. She also reported that he had difficulty with peer relations and did not appear to understand the rules governing social behavior. Drew did not have friends and spent much of his time alone.

Drew's IQ composite, as measured by the *Universal Non-verbal Intelligence Test* (Bracken & McCallum, 1996), yielded a full-scale IQ of 95. His reading composite score was 91, and his math composite score was 74 as measured by the *Kaufman Test of Educational Achievement* (Kaufman & Kaufman, 1985). An outside agency had diagnosed Drew with autistic disorder and referred him to the local university's School Psychology Service Center for treatment.

Drew read his Social Story to his teacher once daily 5 min before his unstructured free-time activity (i.e., lunch).

Billy. Billy, an 8-year-old boy, was fully integrated into a general education first-grade classroom with at least 20 other students, one teacher, and one assistant. He was the only student in the class with a developmental disability. Billy was independent with most self-help skills (including feeding and toileting) but experienced some fine-motor difficulties (especially with holding a pencil and fastening buttons). Billy was sometimes noncompliant with task demands and needed frequent prompting in order to complete assignments and follow classroom rules.

Billy was capable of requesting items and help and answering questions from adults and peers, but he did not elaborate on topics or initiate and respond appropriately. For example, during free time (i.e., recess), he either isolated himself or engaged in stereotypical behavior (e.g., circling the perimeter of a tree and talking to himself while waving a stick). Peers often attempted to interact with him and engage him in conversation; however, he generally either walked away or sat with them without responding. If Billy responded, it was usually with an inappropriate comment (e.g., "Shut up," "Go away"). In addition, Billy often recited the dialogue of many of his favorite Disney movies to his peers without an awareness of whether they were interested or whether they wanted to interject a comment.

Billy was an only child who lived in a two-parent, middle class home. Both parents had some college education. His father was employed, whereas his mother was not employed outside the home. Billy was undergoing chelation therapy for the removal of heavy metals (including mercury and lead) at the time the study was conducted; however, medical treatment had been underway for 2 months prior to the beginning of the study.

Billy's IQ, as measured by the *Kaufman Assessment Battery for Children* (Kaufman & Kaufman, 1983), yielded a mental processing composite of 95. His screener composite score on the *Wechsler Individual Achievement Test* (Wechsler, 1992) was 107, with a score in reading of 109, a score in math reasoning of 91, and a score in spelling of 116. An outside agency

had diagnosed Billy with Asperger syndrome and referred him to the local university's School Psychology Service Center for treatment.

Although Billy was capable of reading, he read extremely slowly and did not enjoy reading; therefore, his teacher read the Social Story to him once daily 5 min before his unstructured free-time activity (i.e., recess).

Setting

Although there were slight differences across specific settings, all were similar types of free-time activities (i.e., lunch or recess) during the school day. Sessions were held at the same time and place each day. Steven's unstructured free-time activity was held in his classroom. Drew's unstructured free-time activity was held in the cafeteria after Drew and his peers had finished eating their lunches. Billy's unstructured free-time activity was held outdoors in a small area just outside his classroom. Only one session per student occurred each day.

Social Stories

For each participant, the first author developed an individualized Social Story (see Appendix C) that described some aspect of free time; the third author reviewed the stories for adherence to Gray's (1998) Social Story construction guidelines. Each Social Story provided the participant with the appropriate social initiations and responses he was expected to make to his peers during that free-time activity. The first author wrote into the stories appropriate social interactions that consisted of initiations and responses that she had previously observed typical peers to make during those free-time activities. These Social Stories were designed to increase the quantity of the children's appropriate social interactions with peers.

The pages of each Social Story were typed on white paper using a 14-point font, mounted onto black construction paper, and compiled into a book-like format that was spiral bound at the top. One or two sentences were placed on each page. The first author wrote the Social Stories in the first person. In an effort to isolate the effects of the Social Stories when used alone, their use was not combined with the use of other interventions, including illustrations.

Design

A multiple baseline design across participants was used in order to assess changes in social interaction skills (Hayes, Barlow, & Nelson-Gray, 1999) during free-time activities. Initially, baseline data were collected simultaneously for all participants. Baseline conditions were identical to those of the intervention during previously described free-time activities (i.e., lunch or recess). Teachers were instructed to respond to the children in their usual manner during both baseline and intervention phases. The Social Story was introduced to Steven after three stable data points had been obtained and while baseline data were collected for Drew and Billy. The Social Story was intro-

duced to Drew after Steven's intervention had been in place for 3 weeks, although no stable treatment effect had yet occurred. This decision was based on the practical and ethical considerations of avoiding an overly extended baseline period for Drew; baseline data continued to be collected for Billy. Finally, the Social Story was introduced to Billy after five data points that documented improved social interactions for Drew had been collected.

Procedure

Data Collection and Interobserver Reliability. For all participants, an *appropriate social interaction* was defined as a verbal, physical, or gestural initiation or response to a peer (e.g., tapping shoulders, handing something to a peer, or receiving something from a peer); a comment or question related to the activity or conversation; continued engagement in the same activity as the peer (e.g., both drawing); a response to a peer's comment or question with a comment related to the conversation; an initiated comment or question related to the conversation; or a physical gesture such as nodding to indicate approval or disagreement.

The first author trained graduate students in data collection procedures on social interactions by having them observe another nonparticipating student with ASD at an elementary school during a free-time activity. Observer training continued until interobserver agreement reached 80% on two consecutive training observations.

Trained observers collected baseline and intervention data on social interactions during one 10-min free-time activity per student 3 days per week for approximately 11 weeks. Observers collected data during the first 10 min of the activity period for Steven and Billy and immediately after Drew and his peers had finished eating their lunches. Baseline data were collected for 3 days for Steven, 14 days for Drew, and 16 days for Billy. Billy was absent during four scheduled baseline observations.

Observers used a partial-interval recording procedure in order to record behavioral observations. An audiotape cued the observers every 10 s to record the occurrence of the target behaviors. During each observation, observers simply marked each interval in which an appropriate social interaction occurred according to the definitions described at the beginning of this section. Data for all participants were collected during the described free-time activities.

Interobserver agreement was measured by assessing the levels of agreement and disagreement during at least 33% of the observations for each participant during both baseline and intervention sessions and was expected to be at least 80%. *Agreement* was defined as occasions when both observers agreed that an appropriate social interaction either occurred or did not occur. *Disagreements* were scored if the observers did not agree on the occurrence of an appropriate social interaction during an interval. Percentages of interobserver agreement was computed by dividing the number of agreements by

the total number of agreements plus disagreements and multiplying by 100%.

Interobserver agreement occurred 14 times for Steven (representing 42% of the observations), 12 times for Drew (representing 36% of the observations), and 11 times for Billy (representing 33% of the observations). For Steven, the mean level of interobserver agreement for appropriate social interactions was 99% (range = 98%–100%). For Drew, the mean level of interobserver agreement was 93% for appropriate social interactions (range = 80%–100%). For Billy, the mean level of interobserver agreement was 88% for appropriate social interactions (range = 83%–100%).

Teacher Training. An experimenter and each teacher together decided the best location in which to read each Social Story. The experimenter then demonstrated how the Social Story should be read and had each teacher practice or role-play the procedure. The examiner judged each teacher competent to implement the intervention after the teacher had successfully completed one trial without an error during training.

Intervention. During the first session of the intervention phase, a teacher read a Social Story to each participant. The teacher sat next to and slightly behind the participant in a portion of the classroom away from the other students. The teacher assessed the participant's comprehension of the story by asking him a set of predetermined comprehension questions (see Appendix C) the first time the Social Story was introduced. These questions were typed on a separate sheet of paper and given them to the teacher. All participants were expected to answer the comprehension questions once with 100% accuracy. If this did not occur, the teacher reread the Social Story and explained the correct answers until the participant was able to answer all questions accurately.

The comprehension questions were on a separate sheet of paper that the teacher removed after each respective student answered all questions correctly once. Thus, the teacher administered the questions once for Drew and twice for Steven and Billy. The teacher read the Social Story to Steven two times and repeated the comprehension questions twice before he was able to answer them accurately. Drew was able to answer the questions the first time the teacher introduced the Social Story. Billy also required the teacher to ask the comprehension questions two times and needed prompting to answer them.

Thereafter, each participant read the Social Story to his teacher (i.e., Drew) one time per day just prior to the free-time activity. If the participant was not yet able to read (i.e., Steven) or read slowly (i.e., Billy), the teacher read the Social Story to him one time per day just prior to the free-time activity. Observers collected data during intervention in the same manner as during baseline.

Treatment Integrity. Teachers were instructed to have each participant read the Social Story one time per day, 5 days

per week, just prior to their scheduled free-time activity. Teachers were instructed to review the Social Story with the participant in either a separate room or an isolated corner of the classroom away from distractions. The participants' teachers recorded whether the participant read the Social Story or was read the Social Story at the specified time that day. They also made notes as to whether the student asked questions or made any other comments during the reading of the story. Furthermore, the teachers were instructed not to prompt participants to interact with their peers in any way.

During the intervention sessions, an experimenter was present 3 days per week and recorded whether the Social Story was read by or to the participant at the specified time. The experimenter also corrected any procedural errors when and if they occurred, although the few errors that may have occurred were not represented as procedural steps in treatment integrity recording. The teacher was responsible for making sure the Social Story was read at the specified time the other 2 days per week, and no examiner verified treatment integrity on those 2 days. Treatment integrity was stated as a percentage and calculated by dividing the number of days the participant read or was read the Social Story by the number of total days in the intervention phase and multiplying by 100%.

Treatment integrity was 100% for Steven and Drew. Treatment integrity was 86% for Billy; after the first time Billy's teacher failed to implement the intervention on one of the days the experimenter was not present, the experimenter left messages daily for the remainder of data collection to remind the teacher to read the Social Story to him. Billy's teacher confirmed with the experimenter that she had received the messages.

Data Analysis

The effectiveness of the intervention was assessed on participants' social interactions by measuring the percentage of intervals of appropriate social interactions exhibited by each participant during 10-min observations across baseline and intervention phases. Appropriate social interactions were graphed for each participant daily as a percentage of intervals. Changes in level, variability, and trend for data points were inspected visually during baseline and intervention phases (Hayes, Barlow, & Nelson-Gray, 1999; Kazdin, 1982).

Results

Appropriate social interactions (see Figure 1) for Steven did not change after the introduction of the Social Story. The mean level of appropriate social interactions during baseline was 1% of intervals (range = 0%–3%) and 4% (range = 0%–65%) during intervention. Steven was absent during one scheduled intervention session.

Drew demonstrated the largest increase in appropriate social interactions during intervention (see Figure 1). For Drew,

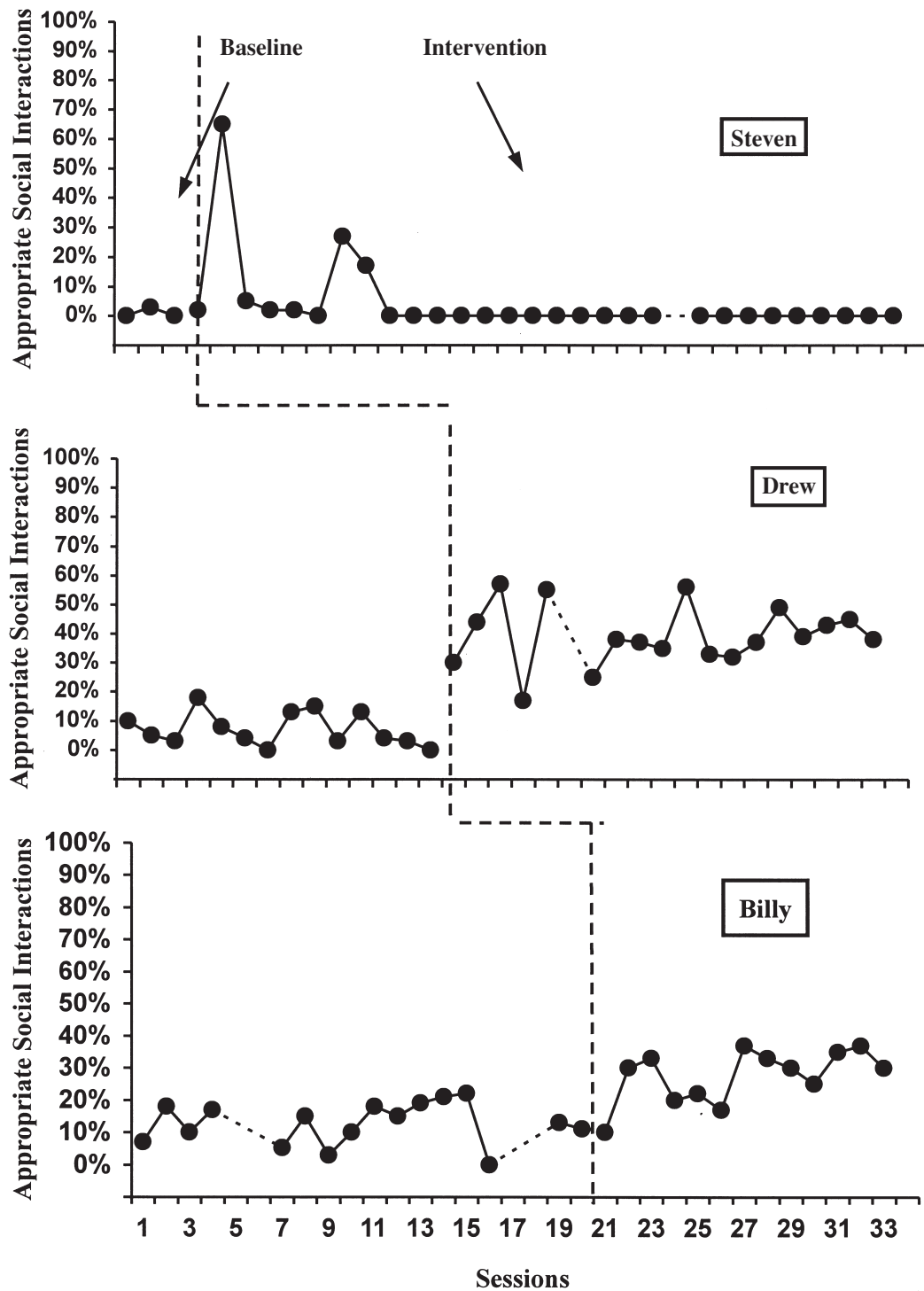


FIGURE 1. Percentages of appropriate social interactions across phases for Steven, Drew, and Billy.

appropriate social interactions ranged from 0%–18% of intervals during baseline ($M = 7\%$). Throughout the intervention phase, appropriate social interactions ranged from 17% to 57% of intervals ($M = 39\%$). Drew was absent during one scheduled intervention session.

For Billy, percentage of intervals of appropriate social interactions during baseline ranged from 0% to 22% ($M = 13\%$; see Figure 1). Appropriate social interactions during intervention increased somewhat and ranged from 10% to 37% of intervals ($M = 28\%$).

Social Validity

Acceptability of the Social Story intervention was assessed at the conclusion of the study by having each participant's teacher complete the *Intervention Rating Profile* (IRP-15; Martens, Witt, Elliott, & Darveaux, 1985). The IRP-15 is a 15-item scale that has been used widely to evaluate teachers' acceptability of interventions (e.g., Doggett, Edwards, Moore, Tingstrom, & Wilczynski, 2001; Ford, Olmi, Edwards, & Tingstrom, 2001; Marlow, Tingstrom, Olmi, & Edwards, 1997; Scattone et al., 2002; Umbreit, Lane, & Dejud, 2004). The established reliability of the IRP-15 is .98 (Martens et al., 1985). Scores on the IRP-15 can range from 15 to 90, with higher scores indicating greater acceptance of interventions. Scores higher than 52.50 indicate that the teacher finds an intervention acceptable (Von Brock & Elliott, 1987). Teacher responses on the IRP-15 were 55 for Steven, 78 for Drew, and 68 for Billy. All scores fell well within the acceptable range.

Percentage of Nonoverlapping Data

To assess intervention effectiveness, the percentage of non-overlapping data (PND) for appropriate social interactions between phases was computed by dividing the number of data points in intervention that did not overlap with data points in baseline by the total number of data points in the intervention phase. Scruggs, Mastropieri, Cook, and Escobar (1986) have suggested that a PND higher than 90% indicates highly effective outcomes, 70% to 90% illustrates fair outcomes, 50% to 70% represents questionable outcomes, and a PND of less than 50% suggests an unreliable treatment. Thus, a PND of 70% between baseline and intervention phases is considered acceptable when determining the effectiveness of the Social Story on each participant's social interactions.

The PND were calculated for each participant's appropriate social interactions. For Steven, PND for appropriate social interactions was only 10%, suggesting an unreliable treatment; for Drew, PND was 89%, only 1 point below the cutoff for a highly effective outcome; for Billy, PND was 69%, only 1 point below the cutoff for a fair outcome.

Discussion

With regard to the overall efficacy of the Social Stories, one participant demonstrated a marked increase in appropriate social interactions. The greatest increase occurred for Drew, whose social interactions improved from a mean of 7% of intervals during baseline to a mean of 39% of intervals during intervention. Billy demonstrated a modest improvement from baseline to intervention (13%–28% of intervals). Steven, on the other hand, demonstrated no meaningful improvement from baseline to intervention (1%–4% of intervals).

Immediate treatment effectiveness was observed for Drew, whose target behavior consisted of appropriate social interactions during free time. Very quickly reading the story be-

came part of his daily routine, and he read the story without prompting. During baseline, Drew appeared motivated to interact, as he did not isolate himself during lunchtime, but it was unclear whether he knew how to socialize in an appropriate manner. However, after the introduction of the Social Story, appropriate interactions increased as he initiated with peers sitting at a nearby table, a behavior he had not engaged in during baseline.

Throughout intervention, Drew talked about his after-school activities (e.g., Nintendo, bike riding) and his dog, both topics within the story. His preferred subject of conversation was wrestling, also a topic within his story, which appeared to generate lively discussion from his male peers as well. However, Drew was never observed asking peers about their pets, their preferred after-school activities, or their favorite television shows, which were also topics within his Social Story. There was anecdotal evidence suggesting that generalization of conversation topics may have occurred for Drew. For example, an examiner observed him talking about his teachers, his classes, and school pictures, which were not conversation topics within the Social Story.

Improvements for Billy, whose social behaviors during baseline included isolation, stereotypies (e.g., circling the perimeter of a tree), and inappropriate interactions (e.g., pushing peers, negative comments), increased 15% above mean baseline levels. Billy was observed talking about Disney movies on several occasions, as his story instructed; however, he was not observed talking about the movies in the way the story suggested. For example, he often provided peers with a verbal list of his favorite movies without talking specifically about the movies themselves. Furthermore, he did not reciprocally ask peers to name their favorite movies.

It should be noted that Billy's appropriate social interactions appeared to be increasing in number toward the end of the study; however, he was the last participant to begin the intervention, and the study concluded 2 weeks later. Perhaps with additional sessions and more time, Billy might have achieved even greater increases in his appropriate social interactions.

Although Billy readily accompanied his teacher to the area where she read the Social Story, Billy was noncompliant with most academic task demands and often resisted reading the story or having the story read to him. Although Billy resisted the story, he liked having his own book and on many occasions asked his teacher if he could bring his book home to keep in his room.

Steven continued to engage in zero rates of appropriate social interactions during treatment with few exceptions (i.e., Intervention Sessions 2, 7, and 8). For example, on one occasion he asked a peer to draw and the two became engaged in the activity for a majority of the session (Intervention Session 2). On two other occasions (Intervention Sessions 7 and 8), the experimenter observed Steven reciting his story aloud from memory (i.e., "I can ask Mary to play with me, and I can ask Joey to play with me"), selecting a toy, approaching the table

where peers were playing, and subsequently playing with a peer for part of the sessions.

Antisocial behavior of the peers in Steven's class may have affected his social interaction behaviors, and the lack of control over the behavior of the other students in the classroom potentially altered treatment outcomes for him. For example, on two occasions Steven asked a peer to play with him; however, each time the peer did not respond, and, subsequently, Steven engaged in inappropriate behaviors (i.e., screaming and throwing toys). The peer's lack of responsiveness may have lessened the likelihood that Steven will initiate in the future. In addition, the examiner observed Steven refusing a peer's request to draw together (i.e., "I don't want to"), again affecting the probability of a future peer initiation. Anecdotal reports indicated that peers in Steven's classroom engaged in disruptive and inappropriate behaviors themselves during playtime. For example, peers were observed to grab markers, erasers, and drawing boards from each other as well as to argue over these items. However, these peers were able to hear the Social Story as it was read to Steven in a corner of the room. Thus, although the Social Story was not effective for Steven, a residual effect appears to be a modification of the behavior of the rest of the class that was exposed to the daily reading of the story. Subsequently, on several occasions the peers were observed to comply with the rules of the story by sharing toys and engaging in conversation.

In the future, it may be beneficial to have the student assist with writing the story as well as reviewing and modifying it before intervention begins. For example, the experimenter did not observe Drew saying "See you later" at the end of his activity as his story suggested. He reported to his teacher that "See you later" was a phrase he did not use; however, it should be noted that Drew did not close his conversations with peers at all. He generally got up from the table and headed back to class. It may have been helpful to have Drew write a Social Story that explained the social importance of closing interactions.

Limitations and Directions for Future Research

Several factors limit generalization of the results, making future research necessary to fully determine the extent to which Social Stories are effective. First, it is unknown whether a Social Story for Steven would have produced positive behavior changes had the story been more specific. For example, Steven's Social Story contained a choice of activities and a choice of peers. Providing several choices may have confused him, whereas a story specifically directing him to draw with a single peer, for example, may have been less ambiguous.

To some degree Steven attempted to comply with the rules stated in the story on several occasions. For example, the examiner observed him playing with puppets and dolls as the story suggested; however, he did not engage in interactive play with his peers for a majority of the sessions. Although he answered the comprehension questions accurately, it is possible

that he did not possess the skills necessary to interact with others in the manner the story described. Also, as noted previously, the behaviors of Steven's peers may have negatively impacted (i.e., lessened) his social initiations.

Although verbal prompts were not a planned part of the research methodology, examiners observed two of the teachers verbally prompting participants by referring directly to the Social Story. For example, Steven's teacher instructed a peer to ask Steven to play. However, the peer refused, suggesting that peers may not always be receptive to the social initiations of students with ASD. Billy's teacher also verbally prompted him on one occasion to "talk nicely to the other students." However, Billy reported that he did not want to talk and then isolated himself for the remainder of the session. The examiner reminded the teacher not to verbally prompt the participant to engage in appropriate social interactions. It is noteworthy that this prompting on the part of the teacher emerged in previous studies as well (e.g., Scattone et al., 2002). The degree to which rigid control over verbal prompting is feasible may be limited in classrooms where teachers try to take advantage of naturally occurring teaching opportunities.

Another possible threat to the internal validity of the study was that Billy was undergoing chelation therapy for the removal of lead, mercury, and other heavy metals at the time the study was conducted. However, this intervention was underway well before the Social Story intervention was implemented and in place for the duration of the study. No changes in the medical intervention occurred in relation to the phase change for Billy.

A final limitation is the manner in which treatment integrity was recorded. Treatment integrity was recorded simply as whether the Social Story was read by or to each participant at the specified time. Additional procedural steps or components (e.g., proper positioning of student and teacher, correct location of the reading, comprehension questions asked only until answered correctly) should have also been recorded. Although the experimenter corrected any procedural errors the few times they occurred, there is no precise empirical record of the percentage of accuracy of these treatment components.

It is difficult to determine the exact role that cognitive ability plays in relation to Social Stories. For example, Drew and Billy both received measured intelligence scores in the average range of cognitive ability (i.e., 95); however, only Drew demonstrated a noticeable improvement in social behaviors. Furthermore, the intervention was not effective for Steven, who had a measured IQ of 67. In the study by Scattone et al. (2002), the most dramatic improvement occurred for the participant with the lowest cognitive score (i.e., 40) on intelligence testing and with little functional communication. However, reading was a preferred activity for that participant, and he was often observed sitting in a corner reading a book. Another participant in that study also read his story and made improvements. However, the final participant did not yet read and had his story read to him; he made only modest im-

provements. Thus, the difference between a participant reading his own story versus having the story read to him warrants further investigation.

In most of the existing studies, either an adult or peer read the Social Stories to the participants. To date, there are only two studies in which the participant read his Social Story aloud to another person (Scattone, Wilczynski, Edwards, & Rabian, 2002; Thiemann & Goldstein, 2001). In the Thiemann and Goldstein study, the participants were fully integrated into regular education for all or part of their day, and all were responsible for reading their own Social Stories. However, one of the participants did not enjoy reading, and researchers made modifications for him and his peers to take turns reading the Social Story aloud.

The age of the participant may also influence the story's effectiveness. Steven and Billy were both 8 years old, whereas Drew was 13 years old, suggesting that, for some students with ASD, adolescence may be a time of increased motivation for learning social interaction skills.

Anecdotal reports by teachers and data collectors indicated that typical peers demonstrated patience and understanding when interacting with their peers with ASD; therefore, future research should also include a typical peer (rather than the teacher) monitoring the reading of the Social Story.

Future investigations should systematically examine the additive effects of Social Stories when combined with other interventions (e.g., prompts, reward systems, video feedback). For example, although the intervention was most effective for Drew and somewhat effective for Billy, effectiveness may have increased for some or all of the participants had an additional component been systematically added.

This study was conducted according to the guidelines proposed by Gray (1998), who developed this intervention through years of experience as an educator. There is no evidence to date that Gray developed these guidelines as part of a systematic research agenda. Researchers should systematically examine each of Gray's guidelines in order to determine which components are crucial in the development of a successful Social Story and which may be irrelevant.

Conclusions

In conclusion, this study replicated and extended the literature by demonstrating that Social Stories may be used in order to increase appropriate social interactions for some children on the autism spectrum when used as a sole intervention. This study differs from previous studies that attempted primarily to promote appropriate social behaviors (Barry & Burlew, 2004; Norris & Dattilo, 1999; Swaggart et al., 1995; Thiemann & Goldstein, 2001) by using only one story to represent a given social situation without the combination of another intervention.

The present study did not achieve the same level of positive behavior change as did a previous study intending to decrease disruptive behaviors (Scattone et al., 2002), although both studies used Social Stories in isolation. One explanation

is that directing a child not to engage in a given disruptive behavior (e.g., chair tipping) is less complex than asking a child to engage in reciprocal conversation or reciprocal play. In addition, Norris and Dattilo (1999) found Social Stories effective in reducing inappropriate social behaviors rather than improving appropriate social behavior. These results may suggest that Social Stories, when used as a sole intervention to increase appropriate social interactions, are limited in their effectiveness. An alternative explanation is that the field has not yet identified the population that may benefit best from this intervention for increasing appropriate social skills. Further research is needed in all of these areas in order to demonstrate the extent to which Social Stories are an effective intervention.

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AUTHORS' NOTES

1. This research was funded by a grant from the Mississippi Psychological Association and is based on the first author's dissertation.
2. Special thanks to Serina Faciane, Iantha Fusilier, and Michael Mueller for assistance with data collection and to the teachers, parents, and participants for making this project possible.

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APPENDIX A

Social Story Format

The Social Story format suggests using a combination of seven sentence types with an emphasis on description:

1. Descriptive sentences describe a given situation objectively by defining where the situation occurs, when it will take place, who is involved, what they are doing, and why they are doing it.
2. Perspective sentences state what another individual, usually someone other than the child with autism spectrum disorder, may think or feel.
3. Cooperative sentences can be used to remind adults how they can assist the student to learn a new skill.
4. Directive sentences are sentences that define the response the individual is expected to provide and generally begin with "I will try" or "I will work on" rather than "I will" to allow for some flexibility.
5. Affirmative sentences generally stress the directive in the Social Story.
6. Control sentences are written by the student and help him or her remember the directive.
7. Partial sentences are fill-in-the-blank sentences that require the student to provide the correct response.

Note. Adapted from Gray (2004).

APPENDIX B

Social Story Guidelines

- Shares social information in a reassuring manner; at least 50% of the stories should praise achievements.
- Has an introduction, body, and conclusion.
- Answers "wh" questions.
- Is written from the student's perspective (i.e., first-person or third-person format).
- States behaviors positively.
- Contains descriptive sentences and some or all of the other types of sentences.
- Describes actions and events rather than directs.
- Is geared to the individual's abilities and incorporates her or his interests.
- May use visual supports and illustrations.
- Has a title that is consistent with applicable criteria above.

Note. Adapted from Gray (2004).

(See Appendix C on next page)

APPENDIX C

Social Stories for Steven, Drew, and Billy

Steven: Playtime

When Miss Anne or Miss Katie says it's playtime, all of the kids go to the play area and take a toy. There are many toys to play with. There are blocks. There are crayons and coloring books. There is Play Doh. There are puppets and dolls. There is also a drawing board and markers.

All of the kids in my classroom like to play at playtime! The kids laugh a lot when they play with each other. The kids talk to each other when they are playing with toys. I will try to play with the other kids. I will walk up to one of the kids and say, "Do you want to play with me?" Sometimes I could ask Mary to play with me. Sometimes I could ask Billy to play with me. Sometimes I could ask Joey to play with me. Sometimes I could ask Missy to play with me. Today, I will try to ask _____ if they will draw with me.

I will walk up to them and tap them on the shoulder. I will say, "Will you draw with me?" I will hand them a marker and eraser. If they do not hear me, I can tap them on the shoulder and say again, "Will you draw with me?" Then I will hand them the marker and walk to the drawing board. Mary will like it if I ask her to draw with me. Billy will like it if I ask him to draw with me. Joey will like it if I ask him to draw with me. Missy will like it if I ask her to draw with me.

Comprehension Questions

1. When Miss Anne or Miss Katie says it's playtime, what do the kids do?
2. What toys can I play with at playtime?
3. Who can I play with at playtime?

Drew: What to Talk About at Lunchtime

There are lots of kids in the cafeteria at lunchtime. Some of the kids are getting their lunch. Some of the kids are already sitting down. Most of the kids are eating lunch. Most of the kids are talking to each other too! The kids like to talk to each other during lunchtime. Usually there are two or three other kids seated at my table. It's good to talk to other kids when sitting in the cafeteria. I will try to talk to the kids seated at my table during lunchtime. They will like it if I talk to them! They will usually talk to me too!

There are lots of things I can talk to the other kids about:

I can tell the other kids about the latest wrestling match on TV. I can tell the other kids what I watched on TV yesterday. I can ask each of the other kids about shows they watched on TV and if they were good or boring.

I can tell the other kids what I'm doing after school today. I can ask each one of them what they are doing after school.

I can tell the other kids about something funny my dog Max did. I can ask the other kids if they have a pet. I can ask them to tell me something funny their pet did.

The other kids may have something they want to talk about too. I can listen to what they say. I may want to talk about those other things too! When lunchtime is over, I will try to say "See you later" to the other kids. Then I will walk with them back to my classroom.

Comprehension Questions

1. What do the kids usually do at lunchtime?
2. What should I do at lunchtime?
3. What kinds of things can I talk with the other kids about?

Billy: Billy's Snack Book

When I am at school, we take a break called snack time. At snack time all of the kids usually go outside. I usually go outside too! There are lots of kids outside at snack time. Some of the kids are standing. Some of the kids are sitting, but they are talking to each other. The kids like to talk to each other at snack time. I will try to talk to the other kids too!

There are many things I can talk to the other kids about: I can ask them what kinds of things they like to do after school. I can tell them what kinds of things I like to do after school. I can talk about what Disney movies I like. I can ask about what Disney movies they watched. I can ask them if they have pets.

The kids will like me if I talk to them. They will want to be my friend!

Comprehension Questions

1. What do the kids do at snack time?
2. What should I do at snack time?
3. What kinds of things could I talk about at snack time?